

D9310

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re amendment to CRAIG PRATER patent application

Serial No. 08/871,029

Examiner: Daniel Larkin

Filed: June 9, 1997

Art Unit: 2856

For: SCANNING STYLUS ATOMIC FORCE MICROSCOPE
WITH CANTILEVER TRACKING AND OPTICAL
ACCESS

Office Action mailed: April 30, 2001

Assistant Commissioner of Patents
Washington, D.C. 20231

DECLARATION UNDER 37 CFR 1.131

Sir:

I, Craig Prater, do hereby declare as follows:

1. I am one of the named inventors of the above-identified application.
2. Attached hereto as Exhibit A are notebook pages from co-inventor David Grigg's notebooks describing an actual reduction to practice of the invention described in the above-identified application.

D9310

3. The reduction to practice of the invention described in the above-identified application and described in the notebook pages of Exhibit A took place prior to the publication date of Jung et al., Electronics Letters, Vol. 29, No. 3, pp. 264-266 (February 4, 1993).

4. Reduction to practice of the invention described in the above-identified application and described in the notebook pages of Exhibit A took place in the United States.

5. Page A-1 of Exhibit A illustrates an atomic force microscope (AFM) having a focus lens disposed between the laser and the scanner. The scanner includes tube scanners through which the laser beam travels. The scanner also includes a lower portion having an asymmetric cutout through which light reflected from the cantilever is directed via a beam splitter to a lateral effect detector. The focus lens produces the "x,y swinging sweet spot" (described as a point source in the application). In the scanner is located a second lens (swinging image transfer or final lens) disposed to focus the laser beam onto the cantilever to follow the cantilever as it is scanned.

D9310

6. Page A-2 of Exhibit A describes testing of the "laser tracking" efficiency of the AFM. The upper chart shows the adjustment of the position of the lenses and their effect on the motion of the focused spot on the scanned cantilever (Δ) as measured by a P.D. (photodetector or lateral effect detector shown on page A-1).

7. Page A-2 of Exhibit A describes, in the lower chart, further testing of the AFM shown on page A-1 through lens adjustment and measurement of the corresponding motion of the focused spot on the scanned cantilever as measured by the photodetector.

8. Page A-3 of Exhibit A describes further testing of the AFM shown on page A-1 through lens adjustment and measurement of the motion of the focused spot on the scanned cantilever as measured by the photodetector. At the bottom of this page the "[l]aser spot follows [the] cantilever] properly" is indicated.

9. The undersigned petitioner declares further that all statements made herein are of his own knowledge and are true, and that all statements made on information and belief are believed to be true; and further that the statements were made with the knowledge that willful false statements

09310

and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or patent issuing thereon.

Executed this 27 day of July, 2001, at Santa Barbara, California.



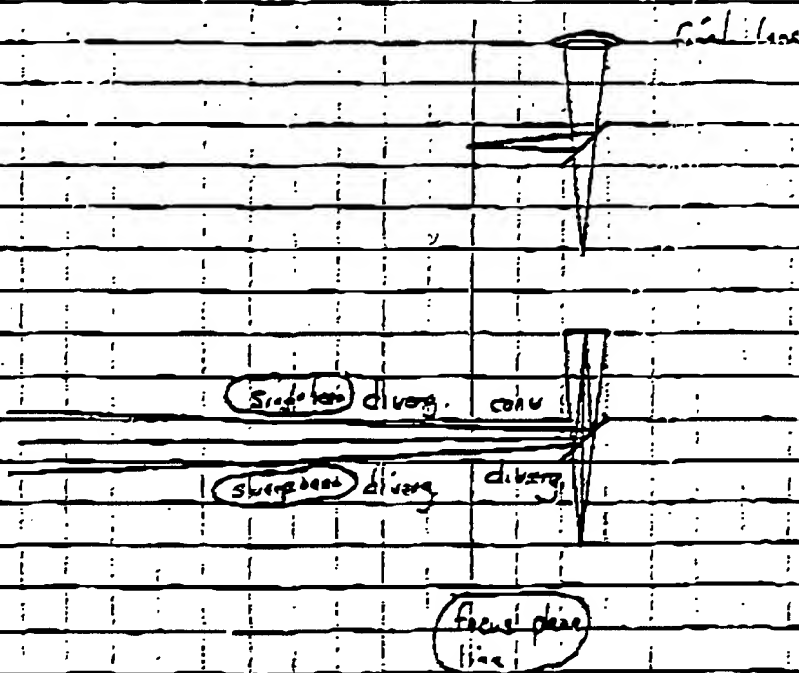
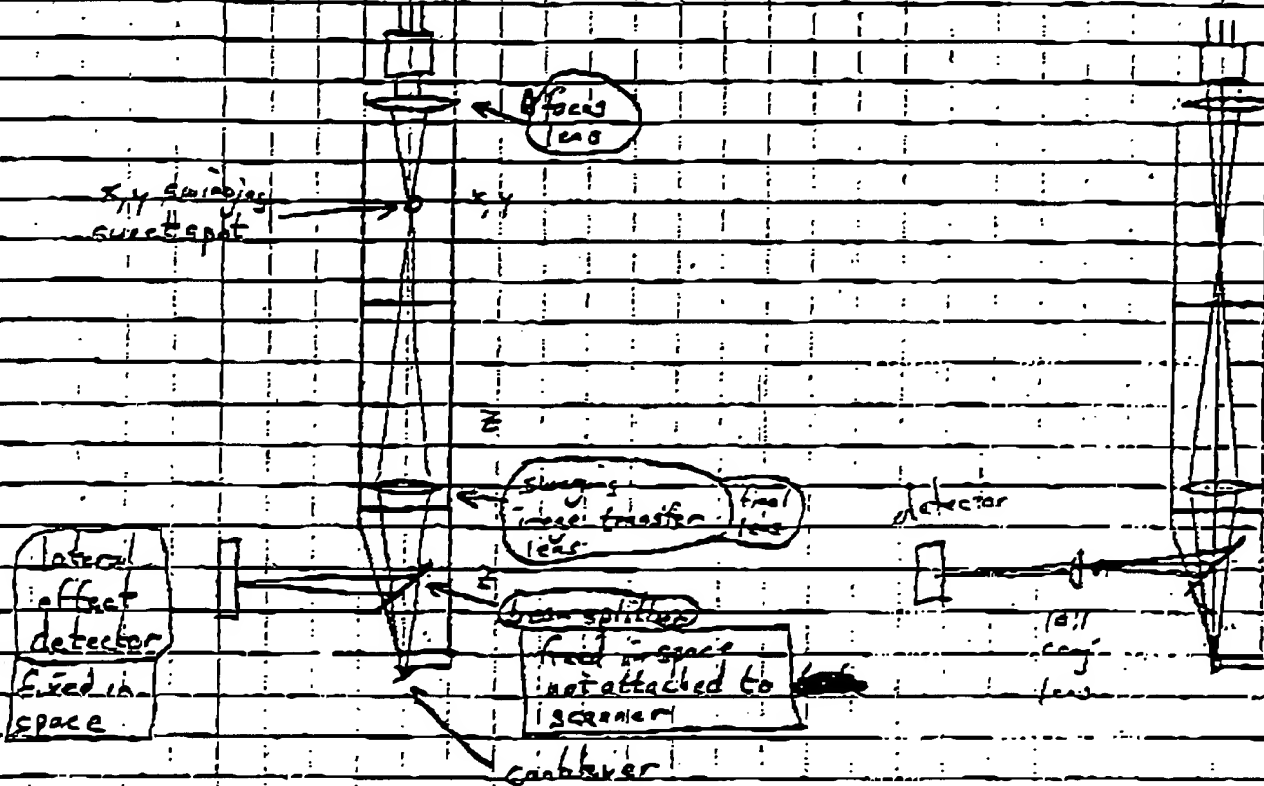
Craig Prater

FROM BRIGHT & LORIG PC

(MON) 07. 30' 01 16:48/ST. 16:42/NO. 3560664760 P 35

EXHIBIT A

Integrated x,y position sensor with stand alone reflection AFM Design



- Testing of laser tracking efficiency

- Replaced laser in Stand alone AFM head

- centered beam by leveling tilt stage & x,y translation of beam to center of constituents

- adjusted output of laser for ≈ 1.5 mW output

Need to adjust primary focus with set
pos. of transfer data in scanner tube.

+220 0 -220 Δ (motion of spec. P.D.)

-1.44 -0.95 -0.50 -0.94 V

-3.30 -1.00 3.90 -3.20 Lower upper fl (G holes)

-4.50 0.50 -1.70 -2.8 repeat raise upper fl (G holes)

2.25 3.95 -4.2 6.45 repeat

3.50 1.40 1.70 3.4 repeat

2.90 0.00 0.32 2.58 raise fl 3 holes

0.45 0.20 3.09 -2.64 repeat

0.65 1.50 3.90 -3.25 repeat

-2.40 1.30 2.50 -4.90 repeat

lower fl 10 holes

raising upper focus
lowers Δ
(from Paul)

Min Δ = proper operation

Starting over

primary lens start at highest pos.

hde = AF hole on side of ins. holder

+220 0 -220 Δ

0.71 1.52 2.25 -1.54

0.78 1.60 2.28 -1.50

-1.39 -1.05 -0.78 -0.61

-1.38 -1.03 -0.77 -0.61

0.56 1.11 1.52 -0.96

0.61 1.21 1.60 -0.89

-1.52 -1.80 -0.25 -1.27

-1.80 -1.10 -0.45 -1.35

0.56 -0.15 0.90 -0.43

0.39 0.70 0.82 -0.48

0.29 0.63 0.77 -0.46

-0.05 -0.71 -0.59 -0.40

2.57 0.83 0.97 -0.40

0.58 0.83 0.98 -0.40

-2.15 -1.18 -0.38 -1.37

-1.35 -1.28 -0.25 -1.37

fl at highest pos

repeat

lower fl 2 holes

repeat

lower fl 1 hole

repeat

lower fl 1 hole

raise fl 3 holes

repeat shift

repeat

repeat

repeat

lower fl 1/2 hole

repeat

lower fl 1/2 hole

repeat shift

(A-2)

220	0	-220	1	
0.30	1.28	.85	-1.55	raise fl 1 hole
0.42	0.95	.25	-0.78	lower fl 2 holes
-1.65	-1.12	-0.85	-0.80	lower fl 1 hole
-1.50	-1.01	-0.76	-0.74	lower fl 1 hole
-2.45	-1.00	-0.24		shift lower fl 1 hole
0.70	2.10	2.70		repeat
-2.75	-1.45	-0.875	-2.0	raise fl 1 hole
0.30	1.60	2.15	-1.85	lower fl 3 holes
0.15	.60	3.05	-2.90	start over
-3.23	-1.90	-1.10	-2.15	lower fl 3 holes
-2.00	0.8	-2.20		raise fl 4 holes
	2.30			
0.18	1.30	1.95	-1.72	lower 10 holes
-2.60	-0.90	-0.35	-1.65	lower 5 holes
0.28	0.65	0.91	-0.63	lower 5 holes
0.32	0.60	0.93	-0.61	lower 1 hole
0.12	0.45	0.60	-0.48	lower 2 holes
0.60	0.79	0.76	-0.16	lower 2 holes
-0.20	0.20			shift lower 2 holes
-1.10	-0.70	-0.98	-0.62	repeat
-0.55	-0.36	-0.73	-0.32	lower 2 holes
-2.35	-2.03	-1.97	-0.38	lower 2 holes
-1.10	-1.10	-0.80		lower 2 holes
1.5	1.40	1.45	-0.30	lower 34 holes
-0.95	-0.76	-0.74	-0.21	lower 3 holes
1.45	1.65	1.50	-0.05	lower 3 holes
0.44	0.50	0.57		locked in place

220	0	-220	1	
-0.13	-0.20	1.15		all the way down (-
0.55	-0.25	1.25	-0.7	
	-0.25			Further down
-0.50	-0.30	-0.30	-0.2	
0.05	0.70	0.85	-0.8	Further down
-0.36	-0.54	0.71	-0.25	Further down
-1.13	-0.91	-1.10		raise 3 holes

A-3